

CLAIMS

We Claim:

1. (Amended) A vacuum seal [(20; 120)] for sealing a pair of opposed metal flanges [(110A, 100B)], the seal [(20; 120)] comprising an outer metallic annular member [(24; 124)] having a generally c-shaped longitudinal radial cross-section and an inner metallic annular member [(22; 122)] having a generally c-shaped longitudinal radial cross-section, wherein the outer metallic annular member [(24; 124)] has a pair of oppositely-directed, longitudinally outward-projecting, ridges [(40A, 40B)] for deformably engaging the pair of opposed metal flanges [(100A, 100B)] and the inner metallic annular member has longitudinal strength and elasticity effective to maintain the ridges [(40A, 40B)] in engagement with the flanges.
2. (Amended) The seal of claim 1 wherein the inner metallic annular member [(22; 122)] provides the primary structural integrity of the seal.
3. (Amended) The seal of claim 1 wherein the inner metallic annular member [(22; 122)] has a characteristic thickness of between about 2 and 4 times a characteristic thickness of the outer metallic annular member [(24; 124)].
4. (Amended) The seal of claim 1 [any of claims 1-3] wherein the inner metallic annular member [(22; 122)] is formed of a nickel-based superalloy and the outer metallic annular member [(24; 124)] is formed of an aluminum-based material.
5. (Amended) The seal of claim 1 [any of claims 1-3] wherein the each of the ridges has a longitudinal extent [(L₃)] beyond a thickness of the outer member away from the ridges.
6. (Amended) An annular vacuum seal [(20; 120)] for sealing first and second opposed flanges [(100A, 100B)] to maintain an internal pressure less than an external pressure, the seal [(20)] having nested inner [(22; 122)] and outer [(24; 124)] members and having a longitudinal radial section which is characterized by:
 - the outer member [(24; 124)] being generally c-shaped and open radially outward; and
 - the inner member [(22; 122)] nested within the outer member [(24)] and being generally c-shaped and open radially outward and having a wall thickness effective to maintain the outer member in engagement with the first and second flanges in the absence of a spring nested within the inner member.

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7. (Amended) The seal of claim 6 wherein:

the inner member [(22; 122)] has a full plating of a copper-base material.

8. (Amended) The seal of claim 6 wherein:

the inner member [(22; 122)] is formed of a nickel-base superalloy; and

the outer member [(24; 124)] is formed of an aluminum-base material.

9. (Amended) The seal of claim 6 [any of claims 6-8] being effective to provide a leakage rate of no more than about 4×10^{-12} cm³/s-mm.

10. (Amended) The seal of claim 6 [any of claims 1-3, 6-8] wherein the inner metallic annular member [(122)] longitudinal radial cross-section has a central arcuate portion [(150)] and a pair of distal straight portions [(150A, 150B)] extending radially outward from opposite ends of the arcuate portion.

11. (Amended) A method for manufacturing an annular vacuum seal [(20; 120)] for sealing first and second opposed flanges [(100A, 100B)] to maintain an internal pressure less than an external pressure, the seal having nested inner [(22; 122)] and outer [(24; 124)] members:

welding ends of a piece of a first metal together to form a first band;

die-forming the first band into a generally c-shaped, open radially outward, cross-section so as to form the inner member [(22; 122)] having a wall thickness effective to resist compression of the seal between the first [(100A)] and second [(100B)] flanges so as to maintain the outer member [(24; 124)] in sealed engagement with the first [(100A)] and second [(100B)] flanges to maintain said internal pressure;

inserting a second band of a second metal within the first band;

forming the second band into a c-shaped cross-section around the inner member [(22; 122)]; and

roll-forming first and second opposed, longitudinally outward projecting, annular ridges in the second band to provide the outer member [(24; 124)].

12. (Amended) The method of claim 11 wherein:

the inner member is plated prior to insertion of the second band; and

the ridges are flat lapped.

13. (Amended) An annular vacuum seal [(20; 120)] for sealing first and second opposed flanges [(100A,100B)] to maintain an internal pressure less than an external pressure, the seal [(20)] having nested inner [(22; 122)] and outer [(24; 124)] members and having a longitudinal radial section which is consists essentially of:

the outer member [(24; 124)] being generally c-shaped and open radially outward;

the inner member [(22; 122)] nested within the outer member [(24)] and being generally c-shaped and open radially outward and having a wall thickness effective to maintain the outer member in engagement with the first and second flanges; and

optionally one or more coating or plating layers.

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